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Distribution extension of Oriental mayfly *Clypeocaenis oligosetosa* Soldán, 1983 (Ephemeroptera: Caenidae)

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Abstract. *Clypeocaenis* Soldán, 1978 consists of 7 species, 3 of them are known from the Oriental region. *Clypeocaenis oligosetosa* Soldán, 1983 was described from Vietnam and until now was known only from 2 localities within this country. We found *C. oligosetosa* in Thailand for the first time. This record significantly extends the known distribution of the species. The main distinguishing characters of the larvae of *C. oligosetosa* are illustrated. We observed a few small morphological differences between Thai specimens, investigated paratypes of *C. oligosetosa* and its original description.

Key words. New record; type material; Pannota; Clypeocaenini; Thailand; Vietnam; Oriental Region

Clypeocaenis Soldán, 1978 (Caenidae: Clypeocaenini) is a rare genus consisting of 7 species distributed in the Oriental, Palaearctic, and Afrotropical regions (Soldán 1978, 1983, Soldán & Landa 1991, Malzacher 2013, Malzacher & Stanichek 2016). Three species of the genus are known from the Oriental region, and only one of them, *Clypeocaenis oligosetosa* Soldán, 1983 is distributed in the continental part of this region. The species was described from Thuan Hai Province in Vietnam (Soldán 1983). Later it was found in Nam Cat Tien National Park (Vietnam) in 1989 (Soldán 1991). According to Soldán (1983, 1991) *C. oligosetosa* was abundant in both sampling places. There were no other records of this species until now. We found *C. oligosetosa* in Thailand for the first time, what extends its known distribution.

All material used in this investigation was preserved in 80–95% EtOH; some larvae were mounted on slides with Canada balsam. The material on *C. oligosetosa* from Thailand is stored in the collection in the National Museum of Natural History of the National Academy of Sciences of Ukraine (the inventory number of vial is Thai8Clysp, number of slide is 638).

Original material. 2 larvae (one mounted in Canada balsam, slide no. 638) Thailand, Chiang Mai Province, Mae-Chaem District, Chaem River, 18°32′43.12″N, 098°21′13.79″E, 450 m a.s.l., 21.xi.2009, Palatov D.M. & Chertoprud M.V. leg.

Comparative material. Paratypes, 7 larvae (1 newly mounted in slide, no. 659) and 1 larval skin (newly mounted in slide, no. 660), Vietnam, Thuan Hai Province, Song Kinh-Dinh River, Nha-Ho, 15 km W of Phan Rang, 11°37′58″N, 108°52′19″E, 16.iv–5.v.1982, T. Soldán leg.

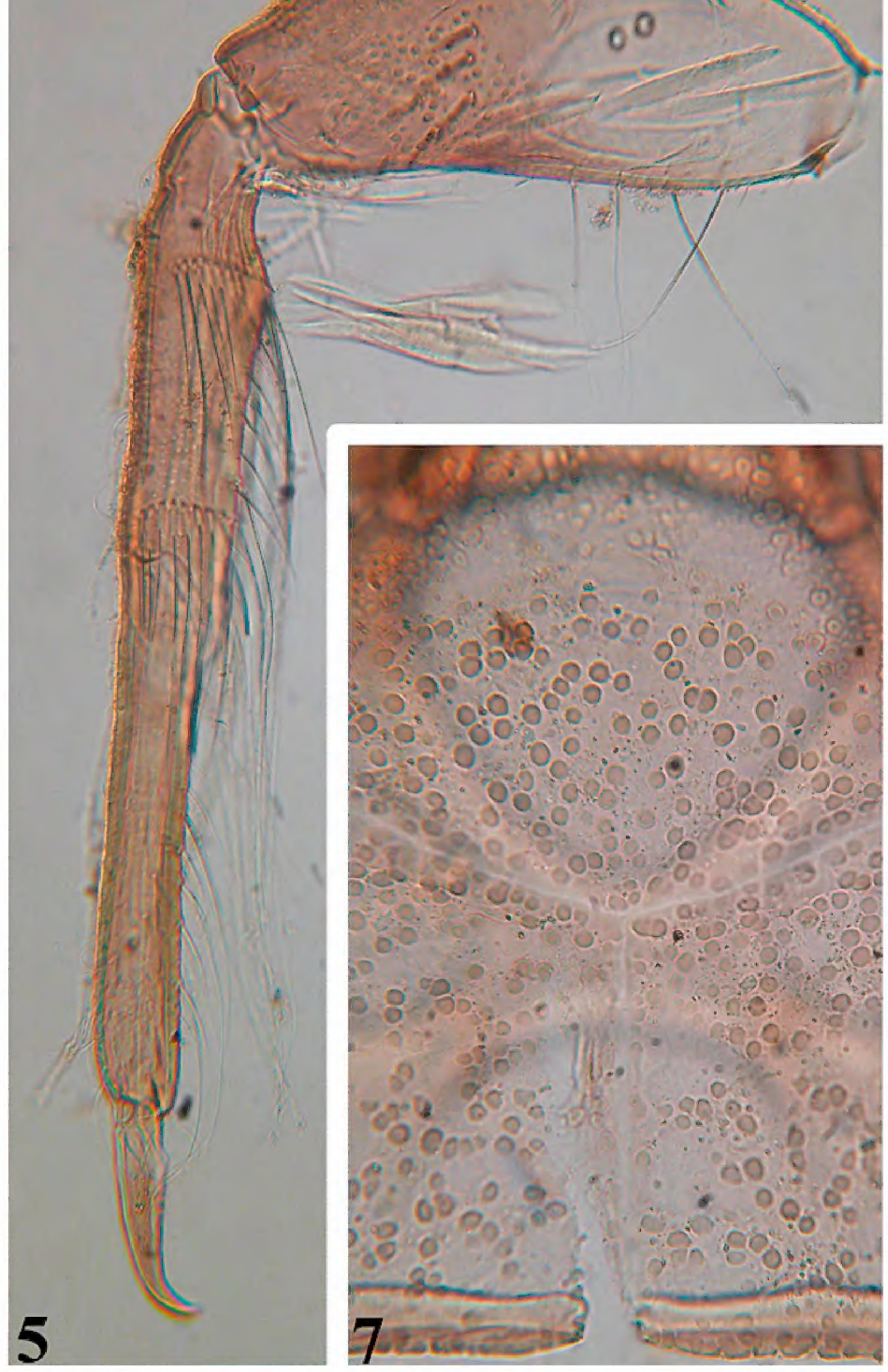
The collected Thai specimens were identified as *Clipeocaenis oligosetosa* basing on the main distinguishing features of this species: shapes of labrum, maxillary palp and labial palp, setation of legs. These characters also distinguish *C. oligosetosa* from all other species of the genus.

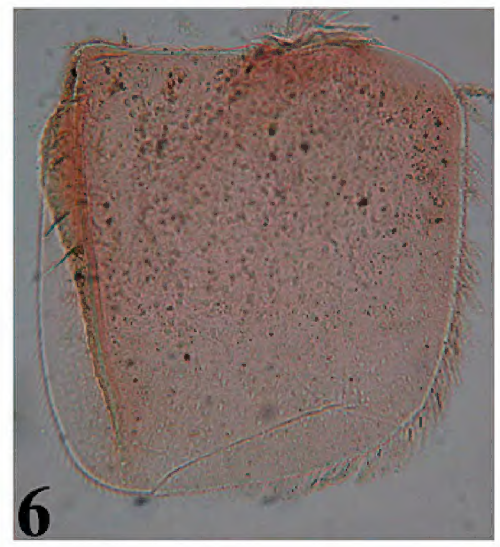
The Thai specimens of *C. oligosetosa* almost fully correspond to the Vietnamese type specimens in the characters as illustrated in Figures 1–10. We observed one difference: specimens from the Chaem River had only 2 long hair-like setae on clypeal protrusion (Fig. 2) in contrast to larvae from the type locality with 4–6 (usually 4) long hair-like setae (Soldán 1983, original data). Additionally, larvae from Thailand and examined type specimens appeared to have pedicellus distinctly broader than the first segment of flagellum (Fig. 2), in contrast to the illustration of Soldán (1983: 198, fig. 4).

The first record of the genus *Clypeocaenis* from Thailand (Songkhla Province) was published by Sites et al. (2001), but as they only had immature larvae, the mayflies were only identified to genus (Fig. 11). They noted that the diagnostic character of the number of setae on the anterior margin of the clypeal protrusion showed intraspecific variation and suggested that a revision of the genus is required.

In Thailand, the larvae of *C. oligosetosa* were sampled from the Chaem River, Shan Highland (Fig. 12). The river here was 15–20 m wide, up to 1.5 m deep, the substrate was sand, pebble, silt, and detritus, and the current velocity was up to 1 m/s. Water temperature on the day of sampling was approximately 21 °C. Numerous settlements and agricultural lands along the river defined a very noticeable level of pollution (beta-mezosaprobic) and increased turbidity. Larvae were collected from submerged grass, detritus, and *Phragmites* sp.

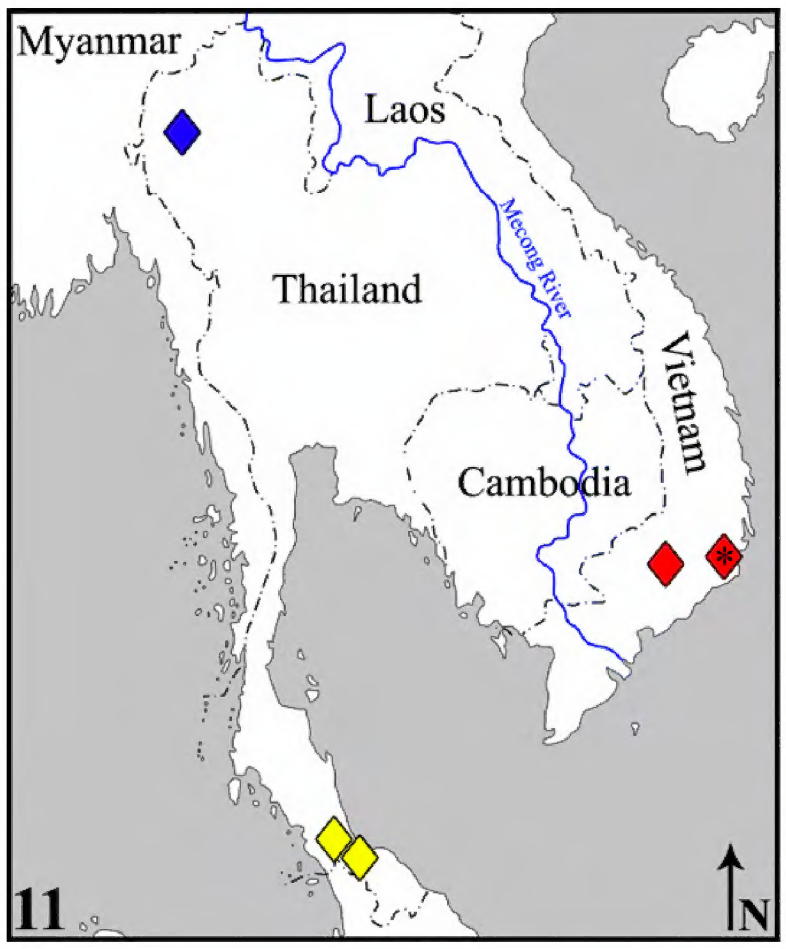
Thus, ecological preferences of *C. oligosetosa* in North Thailand and South Vietnam are quite similar. The larvae of this species inhabit large, well-warmed plain or lowland





Figures 1–10. Larvae of *Clypeocaenis oligosetosa* Soldán, 1983 from the Chaem River, Thailand: **1.** Total view of larva. **2.** Clypeal protrusion and antennae. **3.** Labium. **4.** Maxilla. **5.** Fore leg. **6.** Gill II. **7.** Surface of head near frontal suture. **8–10.** Tarsal claws of fore, middle and hind legs.

watercourses with relatively low flow rates and significant siltation of bottom substrates. They occur in the subcoastal zone, where they inhabit roots of plants, small stones, and detritus. The species develops in quite a wide temperature range from 37.7 °C/22.7 °C (day/night water temperature at the sampling place in South Vietnam, according to Soldán 1983) to 21 °C/18 °C (day/night water temperature at the sampling place of collection in northern Thailand). In northern Thailand, *C. oligosetosa* was found together with other Pannota species—*Dudgeodes romani* Martynov, Palatov & Boonsoong, 2016 (Teloganodidae), *Teloganopsis jinghongensis* (Xu, You & Hsu, 1984) (Ephemerellidae), *Potamanthellus edmundsi* Bae & McCafferty, 1998 (Neoephemeridae), and *Brachycercus* sp. (Caenidae) (Martynov et al. 2016, original data).



Figures 11–12. Collection sites of *Clypeocaenis oligosetosa* Soldán, 1983 and *Clypeocaenis* sp. in Thailand and Vietnam. **11.** Sampling sites of *Clypeocaenis oligosetosa* and *Clypeocaenis* sp. in Thailand and Vietnam (blue diamond = new record of *C. oligosetosa;* red diamonds = records of *C. oligosetosa* in Vietnam (with asterisk = type locality); yellow diamonds = records of *Clypeocaenis* sp. by Sites et al. 2001). **12.** Chaem River, site of new record of *Clypeocaenis oligosetosa* Soldán, 1983 in Thailand.

Our collection of *C. oligosetosa* in Thailand significantly expands the range of this species. This new record in Thailand is more than 1300 km northwest of the two previous records (Fig. 11). We predict that *C. oligosetosa* may inhabit similar waterbodies in Cambodia and Laos. It also might be found in adjacent regions of Shan Highland (including in Myanmar). Nevertheless, we did not find *C. oligosetosa* in the southern part of Cambodia during our investigation of the mayflies in this country in 2009 and 2015.

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